

Nalco Docket No. 7701
Customer Number: 49459

Listing of Claims

Claim 1 (currently amended): A method of inhibiting corrosion of copper plated or metallized surfaces and circuitry in semiconductor devices immersed in an ultrapure aqueous fluid in a treatment bath, the method comprising:

(i) adding to the aqueous fluid an effective corrosion inhibiting amount of one or more aromatic triazole corrosion inhibitors;

(ii) fluorometrically monitoring the concentration of aromatic triazole corrosion inhibitors in the aqueous fluid; ~~and~~

(iii) compensating said fluorometric monitoring based upon a measured temperature and a measured pH; and

(iii)(iv) adding additional aromatic triazole corrosion inhibitor to the aqueous fluid, if needed, to maintain an effective corrosion inhibiting concentration of the aromatic triazole corrosion inhibitor in the aqueous fluid.

Claim 2 (original): The method of claim 1 wherein the aromatic triazole corrosion inhibitors are selected from the group consisting of benzotriazole, butylbenzotriazole, tolyltriazole and naphthotriazole.

Claim 3 (original): The method of claim 1 wherein the aromatic triazole corrosion inhibitor is selected from the group consisting of benzotriazole, tolyltriazole and butylbenzotriazole.

Claim 4 (original): The method of claim 1 wherein the effective corrosion inhibiting amount of triazole corrosion inhibitor is from about 1 ppm to about 1,000 ppm.

Claim 5 (original): The method of claim 1 wherein the effective corrosion inhibiting amount of triazole corrosion inhibitor is from about 10 ppm to about 1,000 ppm.

Claim 6 (original): The method of claim 1 wherein the effective corrosion inhibiting amount of triazole corrosion inhibitor is from about 100 ppm to about 500 ppm.

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Claim 7 (original): The method of claim 1 wherein the concentration of triazole corrosion inhibitor is measured intermittently.

Claim 8 (original): The method of claim 1 wherein the concentration of triazole corrosion inhibitor is measured continuously.

Claim 9 (original): The method of claim 1 wherein the treatment bath comprises an inlet, an outlet, a fluid transfer line connecting said inlet and outlet for circulating the aqueous fluid through said treatment bath and fluid transfer line and monitoring and control means for fluorometrically determining the concentration of aromatic triazole corrosion inhibitor in the aqueous fluid, wherein the monitoring and control means comprise a flowcell installed in the fluid transfer line.

Claim 10 (original): The method of claim 9 wherein the monitoring is accomplished by introducing a sample of the aqueous fluid from the treatment bath into the flowcell and fluorometrically determining the concentration of the aromatic triazole corrosion inhibitor in the aqueous fluid in the flowcell.

Claim 11 (original): The method of claim 10 wherein the aqueous fluid is continuously circulated through the flowcell and the concentration of aqueous triazole corrosion inhibitor is monitored continuously or intermittently.

Claim 12 (original): The method of claim 9 wherein the treatment bath further comprises a supply reservoir containing an aqueous solution of aromatic triazole corrosion inhibitor and a valve or pump for controlling the addition of the aqueous solution of aromatic triazole corrosion inhibitor to the treatment bath.

Claim 13 (original): The method of claim 12 wherein the monitoring and control means comprises a fluorometer for determining the concentration of aromatic triazole corrosion inhibitor in the aqueous fluid and a controller in communication with the valve or pump wherein the controller activates or deactivates the pump or opens or closes the valve based on the concentration of the aqueous aromatic corrosion inhibitor in the aqueous fluid.

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Claim 14 (original): The method of claim 1 wherein the treatment bath comprises an inlet, an outlet, a fluid transfer line connecting said inlet and outlet for circulating the aqueous fluid through said treatment bath and fluid transfer line, a side-stream sample line for removing a sample of aqueous fluid from the fluid transfer line and monitoring and control means for fluorometrically determining the concentration of aromatic triazole corrosion inhibitor in the aqueous fluid, wherein the monitoring and control means comprise a flowcell installed in the side-stream sample line.

Claim 15 (original): The method of claim 14 wherein the monitoring is accomplished by introducing a sample of the aqueous fluid from the treatment bath into the flowcell and fluorometrically determining the concentration of the aromatic triazole corrosion inhibitor in the aqueous fluid in the flowcell.

Claim 16 (original): The method of claim 14 wherein the treatment bath further comprises a supply reservoir containing an aqueous solution of aromatic triazole corrosion inhibitor and a valve or pump for controlling the addition of the aqueous solution of aromatic triazole corrosion inhibitor to the treatment bath.

Claim 17 (original): The method of claim 16 wherein the monitoring and control means comprises a fluorometer for determining the concentration of aromatic triazole corrosion inhibitor in the aqueous fluid and a controller in communication with the valve or pump wherein the controller activates or deactivates the pump or opens or closes the valve based on the concentration of the aqueous aromatic corrosion inhibitor in the aqueous fluid.

Claim 18 (currently amended): A treatment bath for copper plated or metallized semiconductor devices comprising an inlet, an outlet, a fluid transfer line connecting said inlet and outlet for circulating ultrapure aqueous fluid containing one or more aromatic triazole corrosion inhibitors through said treatment bath and fluid transfer line and monitoring and control means for fluorometrically determining the concentration of aromatic triazole corrosion inhibitor in the aqueous fluid, wherein the monitoring and control means comprise a flowcell installed in the fluid transfer line, and wherein the monitoring and control means includes a means to compensate for a measured temperature and a measured pH.

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Claim 19 (currently amended): The treatment bath according to claim [[9]] 18 further comprising a supply reservoir containing an aqueous solution of aromatic triazole corrosion inhibitor and a valve or pump for controlling the addition of the aqueous solution of aromatic triazole corrosion inhibitor to the treatment bath.

Claim 20 (currently amended): A treatment bath for copper plated or metallized semiconductor devices comprising an inlet, an outlet, a fluid transfer line connecting said inlet and said outlet for circulating an ultrapure aqueous fluid containing one or more aromatic triazole corrosion inhibitors through said treatment bath and fluid transfer line, a side-stream sample line for removing a sample of aqueous fluid from the fluid transfer line and monitoring and control means for fluorometrically determining the concentration of aromatic triazole corrosion inhibitor in the aqueous fluid, wherein the monitoring and control means comprise a flowcell installed in the side-stream sample line, and wherein the monitoring and control means includes a means to compensate for a measured temperature and a measured pH.

Claim 21 (original): The treatment bath according to claim 20 further comprising a supply reservoir containing an aqueous solution of aromatic triazole corrosion inhibitor and a valve or pump for controlling the addition of the aqueous solution of aromatic triazole corrosion inhibitor to the treatment bath.